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Supplemental nutrition assistance program participation and sugar-sweetened beverage consumption, overall and by source☆

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ABSTRACT

Introduction. This paper examined patterns in adults' sugar-sweetened beverage (SSB) consumption and caloric intake by Supplemental Nutrition Assistance Program (SNAP) participation status and by source of purchases in the United States (US).

Method. Cross-sectional analysis of consumption of SSBs by source of purchases using 24-hour dietary recall data obtained from the US National Health and Nutrition Examination Survey 2003–2010 (N = 17,891). Bivariate analysis and multivariable regressions were used to examine the association between SNAP participation and SSB calories consumed overall and by source.

Results. SSBs account for approximately 12% of total daily caloric intake (258 kcal) among SNAP participants, higher than that of SNAP-eligible nonparticipants (9% total daily intake, 205 kcal) and SNAP-ineligible nonparticipants (6% total daily intake, 153 kcal). Among income-eligible adults, participating in SNAP is associated with 28.9 additional SSB calories, of which most were obtained from a store. From 2003–04 to 2009–10, SSB prevalence and caloric intake were flat among SNAP participants while it declined among both SNAP-eligible and SNAP-ineligible nonparticipants; this pattern held for all sources of SSBs except for those purchased from fast-food restaurants, which were not statistically reduced among nonparticipants.

Conclusion. SNAP participants consumed more SSB calories compared to SNAP-eligible nonparticipants; and their SSB prevalence and caloric intake trend was flat over the 2003–04 to 2009–10 period. SNAP-Education interventions that focus on improving access to healthy food in poor neighborhoods may benefit SNAP participants.

Introduction

The Supplemental Nutritional Assistance Program (SNAP), a US federal nutrition assistance program supporting nearly 46 million people (one in seven Americans) and receiving 74.1 billion in federal funding in 2014, aims to provide low-income individuals with a nutritionally adequate diet, thus improving their health (Barnhill, 2011; Hoynes and Schanzenbach, 2015). SNAP benefits, however, can be used to pay for any food or beverage in stores (except alcohol, vitamins, tobacco, and hot prepared items), leaving food decisions to the recipient's discretion (USDA, 2015). Consumption of sugar-sweetened beverages (SSBs), which are covered under SNAP benefits, have been shown to increase risk for obesity, diabetes, and heart diseases (Hu and Malik, 2010; Malik et al., 2010; Miller et al., 2013). Obesity alone (not including other chronic diseases related to poor diet) costs the US $147 to $190 billion in health care dollars per year (Cawley and Meyerhoefer, 2012; Finkelstein et al., 2009; Friedman and Brownell, 2012).

It has been argued that a ban on using SNAP benefits to purchase SSBs may discourage SSB consumption, reduce obesity prevalence and type 2 diabetes incidence, particularly among adults (Basu et al., 2013, 2014; Brownell and Ludwig, 2011). Some states, including Illinois, New York, and Minnesota, have requested greater flexibility from the United States Department of Agriculture to limit approved SNAP purchases; to date, those requests have been denied (Brownell and Ludwig, 2011). On the other hand, it has also been argued that restrictions on SNAP benefits may create stigma among poor Americans and send a controversial public policy message that poor but not non-poor individuals require government intervention to manage their food choices (Kass et al., 2014; Laraia, 2012).

Some studies have shown that among low-income adults, SNAP participants had lower dietary quality and consumed more SSBs than nonparticipants (Bleich et al., 2013; Leung et al., 2012; Nguyen et al., 2014), though one recent study found no difference (Todd and Ver Ploeg, 2014). However, little is known about the differences in patterns and trends in SSB consumption between SNAP participants and nonparticipants (Nielsen et al., 2002). While SNAP currently pays for an estimated $4 billion in soft drinks per year (Shenkin and Jacobson, 2010), with at least $1.7 to $2.1 billion of this purchased in grocery stores (Andreyeva

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et al., 2012), no studies to date have examined the question of where SNAP recipients obtain their SSBs, i.e. by source of purchases such as stores, fast-food restaurants, full-service restaurants, and other places. Similarly, a recent study found a widening gap in dietary quality trends across socioeconomic groups but did not further explain the attributing sources, i.e. from consuming food from a store or from a fast-food restaurant (Wang et al., 2014). Nevertheless, policies focusing on specific food items or particular food sources could be an alternative approach in the fight against obesity (Powell et al., 2015).

The purpose of this study was twofold. First, we sought to study and compare the trends and patterns of sugar-sweetened beverage consumption (both prevalence and caloric intake) among SNAP participants, SNAP-eligible nonparticipants, and SNAP-ineligible nonparticipants from 2003–04 to 2009–10, including by source such as from stores, fast-food restaurants, full-service restaurants, and other sources. Second, we used multivariable regression analyses to examine the association of SNAP participation and SSB intake by source.

Methods

Data

Data were obtained from 4 waves of the continuous National Health and Nutrition Examination Survey (NHANES): 2003–2010. NHANES is a nationally representative ongoing survey that assesses the health and nutritional status of the US population (Johnson et al., 2010). A complete description of the survey design, participant selection, and collection procedures is provided elsewhere (CDC National Center for Health Statistics (NCHS), 2013).

SNAP participation was determined by an affirmative response to the question, "In the last 12 months, did [you, or any member of your household] receive food stamp benefits?" (CDC National Center for Health Statistics (NCHS), 2013). SNAP eligibility was determined via the poverty-income ratio (PIR). If household income was equal to or less than 130% of the federal poverty level (FPL), adults in the household were considered eligible for SNAP benefits. Non-pregnant adults aged 20 years and above with complete dietary survey data were included in the study, which comprised 17,891 individuals: 2744 were SNAP participants, 3300 were SNAP-eligible nonparticipants, and 11,847 were not eligible for SNAP (SNAP-ineligible nonparticipants).

Information on consumption was based on the NHANES dietary recall data, for which respondents reported on all food and beverages consumed in the past 24 hours. The first-day individual-level dietary data were collected by a trained interviewer in a mobile examination center (MEC) (CDC, 2008). SSBs were defined as any non-diet, non-alcoholic beverage items sweetened with various forms of sugars that add calories such as regular soda, regular fruit juice, sugar-sweetened coffee and tea, regular sport drink, energy drink, and carbonated water. Survey respondents were asked about the source of each food and beverage item obtained (e.g., a store, a restaurant serving fast-food/pizza, a full-service restaurant, and other sources such as a friend's house). Data on consumption of SSBs were aggregated at the individual level to obtain the total number of occasions and energy intake in kilocalories from all SSBs and specific types of SSBs.

Statistical analyses

All statistical analyses were undertaken using STATA Version 13 (StataCorp, 2013). Given that dietary recall data were obtained from the Mobile Examination Center sample individuals, the MEC sample weights were used in all analyses. Chi-square and ANOVA were used to test the differences across the three SNAP participant/nonparticipant groups as well as changes over time. Multivariable regressions of the prevalence of consumption and SNAP participation were estimated using logistic regression models and odds ratios and 95% confidence intervals were reported. Multivariable linear regressions (ordinary least squares) were used to examine the association between SNAP participation and SSB calories consumed. The multivariable regression analyses controlled for age, gender, race/ethnicity (non-Hispanic white, non-Hispanic black, Hispanic, other), education (less than high school, high school, some college, college or more), marital status (married, never married, divorced or separated, widowed), poverty-to-income ratio (PIR), household food security, Women, Infants and Children (WIC) program participation in the past year, health insurance status, employment status, whether the survey was completed on a weekday or weekend, (Haines et al., 2003) and NHANES waves (2003–2004, 2005–2006, 2007–2008, 2009–2010). For the regression analyses, we focused on the SNAP-eligible population with family income lower than 130% of the FPL to reduce the residual confounding in the sample, especially between the high- vs. low-income group.

Results

Table 1 shows that among our adult sample aged 20 and over, 8% were SNAP participants, 12% were SNAP-eligible nonparticipants, and 80% were SNAP-ineligible nonparticipants. The table also presents the characteristics for our sample and stratified by SNAP eligibility and participation. Specifically, 54% of American adults consumed SSBs on a given day; by subgroups, 69% of SNAP participants, 60% of SNAP-eligible nonparticipants, and 51% of SNAP-ineligible participants consumed SSBs. In addition, on average, SNAP participants consumed 258 kcal of SSBs, which was significantly ($p \le 0.001$) higher than SNAP-eligible nonparticipants (204 kcal) and ineligible nonparticipants (153 kcal). Further, the percentage of SSBs out of total caloric intake was significantly ($p \le 0.001$) higher among SNAP participants (12%) than SNAP-eligible nonparticipants (9%) and SNAP-ineligible nonparticipants (6%).

Table 2 depicts the trends in SSB prevalence and consumption from 2003–04 to 2009–10 across SNAP participants, SNAP-eligible nonparticipants and SNAP-ineligible nonparticipants The prevalence of SSB consumption did not change significantly among SNAP participants between 2003–04 and 2009–10 (71% in 2003–04 and 69% in 2009–10). In contrast, from 2003–04 to 2009–10, the prevalence of SSB consumption among SNAP nonparticipants, which was already lower

Table 1
Characteristics of US adult population (aged 20 and above), National Health and Nutrition Examination Survey 2003–2010.

	Full sample	SNAP participants	SNAP-eligible nonparticipants	SNAP-ineligible nonparticipants	p-value
Sample characteristics	100%	8%	12%	80%	
Male	49%	41%	46%	50%	<0.001
Female	51%	59%	54%	50%	
White	72%	48%	56%	77%	<0.001
Black	11%	27%	12%	9%	
Hispanic	12%	21%	25%	9%	
Other races	5%	4%	7%	5%	
SSB consumption	Mean (±SE)	Mean (±SE)	Mean (±SE)	Mean (±SE)	
–SSB, prevalence (%)	54	69	60	51	<0.001
–SSB, kcal	167.4 ± 4.2	258.0 ± 10.3	205.0 ± 8.2	153.0 ± 3.8	<0.001
–Added sugar, teaspoons	18.6 ± 0.3	22.6 ± 0.56	20.1 ± 0.6	17.9 ± 0.3	<0.001
–Total calories	2195.2 ± 12.6	2172.6 ± 26.5	2123.4 ± 28	2209.8 ± 13.5	0.002
–Percentage of SSBs of total calorie intake (%)	7	12	9	6	<0.001
Number of observations	17,891	2744	3300	11,847	

Note: All summary statistics are weighted using the National Health and Nutrition Examination Survey examination weight. P-value for joint difference across 3 SNAP groups is based on chi-square for categorical variables and ANOVA for continuous variables.